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ABSTRACT

To investigate the strategies children use in comprehending written stories, third, sixth, and ninth grade students were given scrambled six-sentence stories and asked to reorder them. Three versions of each of six stories were created. The first version was the canonical form of the story predicted by story grammar rules; the second version began with a sentence which questioned the conclusion of the canonical form; and in the third this conclusion began the story. Significant effects of grade and structure indicated that the canonical form was more easily ordered than were the other structures, and also that third grade students were less accurate at the task than were sixth or ninth grade students. These effects were shown for pairwise and completely correct orderings and for a confidence-rating measure. Additionally, children were shown to use an event-sequence strategy and to attend to various surface text features. However, the results suggested that the deep structure (story grammar structure) was of much greater importance in comprehension than were features of surface structure. (Author)

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Technical Report No. 122

# STORY STRUCTURE AND AGE EFFECTS ON CHILDREN'S ABILITY TO SEQUENCE STORIES

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Abstract

To investigate the strategies children use in comprehending written stories, third, sixth, and ninth graders were given scrambled six sentence stories and asked to reorder them. Three versions of each of six stories were created. The first version was the canonical form of the story predicted by story grammar rules; the second version began with a sentence questioning the conclusion of the canonical form, while in the third this conclusion began the story. Significant effects of grade and structure indicate that the canonical form is more easily ordered than are the other structures, and also that third graders are much less accurate at the task than are sixth or ninth graders. These effects are shown for pairwise and completely correct orderings and for a confidence rating measure. Additionally children were shown to use an event-sequence strategy and to attend to various surface text features. However, the results suggest that the deep structure (story grammar structure) is of much greater importance in comprehension than are features of surface structure.

# Story Structure and Age Effects on Children's Ability to Sequence Stories

During the past few years, a growing area in reading research has been concerned with the study of text comprehension. Much of this research has utilized the story as the unit of analysis. The story has so frequently been chosen not only because of its salience as a prose form but also because there is an extensive tradition of investigation into its structure by scholars in the fields of linguistics (van Dijk, 1972), anthropology (Levi-Strauss, 1955; Dundes, 1964) and literature (Greimas, 1971; Propp, 1958; Prince, 1973; Todorov, 1969) as well as psychology (Bartlett, 1932) upon which to build, and because the story's plasticity lends itself to experimental manipulation.

Most of the recent psychological research on story comprehension has focused on memory. The general consensus in this literature (Kintsch, Mandel, & Kozminski, 1977; Kintsch & van Dijk, 1975; Mandler & Johnson, 1977; Stein & Glenn, 1977; Stein & Nezworski, in press; Thorndyke, 1977) is that surface characteristics of a story text have little bearing on the memory representation. A major tenet is that a story has a canonical form and that even should a given story text deviate from it, it is still in terms of this canonical form that the story is organized for recall. This emphasis on underlying structure has been challenged by Baker (1978) in a series of experiments demonstrating that "episodic information, specifically information about the temporal order of input, has a strong influence

on the immediate representation of simple stories" (p. 29). Her position finds some support in Stein and Nezworski (in press), who have also shown that "adults retain some degree of a surface representation of stories violating the expected sequence and that recall undergoes greater reorganization than performance on other tasks, such as recognition or reconstruction (Stein, 1978)." In line also with these findings are those of Stein and Glenn (1978) who found that although when children were asked to construct "good" stories from a scrambled set of stimulus materials, their stories corresponded positively to the proposed sequence of story events; nevertheless, several deviations from the expected sequence did occur frequently.

The study to be discussed here uses a technique similar to the scrambled story technique of Stein and Glenn (1978) with the intention of further investigating the strategies children use in comprehending stories. It will examine not only the role of underlying story schemata but also the role of surface text features.

## Method

### Materials

Eleven stories, written for a workbook sequencing exercise by Barnell Loft Co. (Boning, 1973) were scrambled and given to 26 third and fourth grade children and 20 adults to reorder. These pilot results, which indicated that sequencing is strongly related to reading comprehension ability, provided a rationale for the selection and adaptation of six stories and

for the construction of alternate means of scoring the task. The stories chosen were the ones for which the adults' ordering showed the greatest agreement. (These were not necessarily the orderings listed as "correct" by the publishers.) All presented a narrative about one or more characters and included an initiating statement which, from the series of events, led to a change or result which was directly or indirectly stated.

Three versions of each chosen story -- a setting version, a question version, and a conclusion version -- were created and then piloted with university students. The setting version was intended to approximate most closely a story grammar structure (Stein & Glenn, 1977; Stein, 1978). This means that one or two setting or event-initiating statements were followed by a sequence of event statements and then by a result or summary. The question version contained either a question-transformed first sentence or another question sentence which preceded the original first sentence. The conclusion version transformed the final sentence into a statement that was now used as the first sentence in the story, preceding or replacing the original first sentence. For each story, sentence length and semantic content remained approximately equivalent across versions, that is, sentences differed across versions only when necessary because of the manipulation of the initial sentence. Story length was held constant to six sentences. The three versions of one of the stories appear below. The numbers to the left indicate the correct ordering.

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Insert next page about here

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## Conclusion version

2 One day, they searched a truck which they thought contained drugs.

5 He sniffed at the truck floor.

4 Then they led a German shepherd to the truck.

6 Pulling it up, the police found a fortune in drugs.

1 The border police have found a new helper that drug smugglers cannot fool.

3 But they did not find anything.

## Question version

5 Pulling it up, the police found a fortune in drugs.

3 Then they led a German shepherd to the truck.

4 He sniffed at the truck floor.

6 They had also found a new helper that drug smugglers could not fool.

2 One day they searched a suspicious truck but could not find anything.

1 Can the border police find drugs hidden in a truck?

## Setting version

6 They had also found a new helper that drug smugglers could not fool.

5 Pulling it up, the police found a fortune in drugs.

3 Then they led a German shepherd to the truck.

2 The border police searched it but could not find anything.

4 He sniffed at the truck floor.

1 One day a suspicious truck drove up to the border.

## Subjects

Two-hundred fourteen students, three classrooms each from grades three, six, and nine, participated in the study. The schools, which were in a town near a midwestern university, serviced both local and rural middle-class families. There were no minority groups represented in the sample. Reading achievement of third grade students ranged from 1.7 to 5.4, of sixth grade from 3.5 to 10.5, and of ninth grade from 6.9 to 12.6.

## Procedure

Students were tested by the authors of this paper in their classrooms. After being shown an example, they were asked to read the scrambled sentences and place a 1 next to the sentence that they thought should be the first in a story, a 2 next to the second sentence, and so on to the sixth. They were then asked to reread the sentences in the chosen order to make sure that they were satisfied with that order. Following this they evaluated their sequence: they wrote down 3 if they were very sure that they had the right order, 2 if they were fairly sure, 1 if they had made a good guess, and 0 if they were not sure at all. While they worked, they were allowed to request assistance in word identification, if needed, but they were given no help on the sequencing task. Each subject was given only one version of each story. The stories were presented on separate pages.

## Scoring

Three methods of scoring were constructed for the principal analysis. The first is a totally correct sequence, correctness having been defined as

orderings most frequently agreed upon by skilled readers. Since the score appears as a 0 or 1 for each story, its total can be read as a percentage correct value. The second is a pairs correct score: for each story a point is given for any two sentences which appear in the correct consecutive order. Since there are six sentences, the score range for each story is from 0 to 5. Referring to the example above, a child who follows ". . . led a German shepherd to the truck" with "He sniffed . . ." whether ordered 1-2, 2-3, 3-4, or 5-6, would receive at least 1 pairs correct point. The third score is a confidence rating which, for each story, is between 0 and 3. This served to determine whether children recognized the greater difficulty of one or another of the story versions.

Design

In order to provide a counterbalanced design, three booklets of six stories were prepared. Each booklet contained one version of each of the six stories. The versions were arranged in Latin Square formats to insure that each story was represented by each version and that each version appeared twice in each booklet. For example, the first three stories in Booklet A were: setting structure of Lost Dog, question structure of The Bridge Builder, and conclusion structure of Bloodhound. The first three in Booklet B were: question structure of Lost Dog, conclusion structure of The Bridge Builder, and setting structure of Bloodhound. The analysis of variance design chosen allowed for between-subjects effects for grade and booklet and within subjects effects for story version (structure) and its

replication (the first versus the second instance of a type of story structure). This design was used for each dependent measure: total correct, pairs correct, and confidence rating.

## Results

### Total Correct

There were significant effects for each independent variable: grade, $F(2,205) = 64.5$, $p < .001$; structure, $F(2,410) = 34.6$, $p < .001$; replication, $F(1,205) = 65.9$, $p < .001$; and booklet, $F(2,205) = 8.0$, $p < .001$. A Newman Keuls test indicated a significant difference between grade three (mean correct score of 6%) and six (mean correct score of 31%) but not between grades six and nine (mean correct score of 51%). Structure effects were as predicted with the setting version significantly easier (40%) than the question (28%) or conclusion (21%) versions. The replication effect indicated that children improved on the task. The first instance of a structure averaged 22% while the second averaged 37%. With respect to booklet effects, Booklet A (38%) was somewhat but not significantly easier than Booklets B (24%) and C (26%).

Two of the significant interactions extended an understanding of the grade findings; the other three help to explicate the booklet effects. The grade by structure interaction $F(2,410) = 4.5$, $p < .01$, which is displayed in Figure 1, indicated an increasing differentiation of the three structures with reading skill. The grade by replication interaction, $F(2,205) = 9.9$, $p < .001$ (Figure 2), shows that all groups nearly doubled their score on the task when a structure was repeated; however, the actual magnitude of the change was much less for the youngest group.

The three-way significant interaction, grade by booklet by structure, $F(8,410) = 3.2$, $p < .01$, merely duplicates the earlier findings: the range of scores at grade three is very narrow--2% correct on the hardest story to 16% correct on the easiest--while in grade six scores range from 10% to 56% correct and in grade nine from 22% to 68% correct. The same booklets and structures define the extremes in all three grades.

Two other interactions are related to the untoward effects of particular stories. A booklet by structure interaction, $F(4,410) = 5.2$, $p < .001$, indicates that the B booklet question version stories were considerably more difficult than were other versions. A booklet by replication interaction, $F(2,205) = 12.1$, $p < .001$, demonstrates that, contrary to the general replication effect, the second instance of each structure in the B booklet was almost as hard as the first.

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Insert Figures 1 and 2 about here

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Pairs Correct

Results similar to the first analysis were obtained for the pairs correct measure. Significant grade effects, $F(2,205) = 113.8$, were clarified with a Newman Keuls test which showed that grade three (1.55) was $p < .001$, significantly different from grade six (2.96) and grade 9 (3.75). Structure effects, $F(2,410) = 19.7$, $p < .001$, showed again that the setting versions were significantly easier (3.06) than the question (2.57) or conclusion (2.61) versions. The replication factor, $F(1.205) = 97.6$, $p < .001$, indicated an improvement from 2.40 to 3.10. [Booklet A (2.10) was somewhat but not

significantly easier than Booklets B (2.54) or C (2.61) with $F(2,205) = 8.4$, $p < .001$.]

None of the interactions accounted for much of the variance. The grade by replication effect, $F(2,205) = 5.6$, $p < .01$, indicated a smaller improvement in grade three (from 1.37 to 1.73) than in grade six (from 2.53 to 3.39) or grade nine (3.32 to 4.18). A structure by replication effect, $F(2,410) = 3.8$, $p < .03$, showed a greater improvement between the first and second instances of the question structure than between those for the other two structures. A booklet by replication interaction, $F(2,205) = 5.7$, $p < .01$, indicated that Booklets B and C were equally much more difficult than A on the first instance of a structure but were not as different on its replication. A greater difficulty in Booklet B with the question structure was indicated by a booklet by structure interaction, $F(4,410) = 5.7$, $p < .001$. Finally, in a grade by booklet by structure interaction, $F(8,410) = 2.9$, $p < .01$, the booklet by structure variability was complicated somewhat by the greater range of booklet-structure scores in grade six (from 1.9 to 3.8) than in grade three (1.2 to 2.0) or grade nine (2.9 to 4.2).

Ratings

Ratings were less sensitive than the accuracy measures to the differences in stories, although they were affected somewhat. A main effect of structure, $F(2,410) = 5.8$, $p < .01$, showed that students recognized that the setting version ($\bar{X} = 2.36$) was easier than the question ($\bar{X} = 2.20$) or

conclusion ($\bar{X}$ = 2.29) version. Then, a booklet by structure interaction, $F(4,410) = 5.10$, $p < .001$, indicated that students gave lower ratings to the conclusion and question versions in Booklet B than to those in Booklets A and C. A main effect for grade, $F(2,205) = 26.6$, $p < .001$, found rating mirroring real difficulty, $\bar{X}$ (grade 3) = 1.92, $\bar{X}$ (grade 6) = 2.33, $\bar{X}$ (grade 9) = 2.60. In a grade by replication interaction, $F(2,205) = 8.0$, $p < .001$, it can be seen in Figure 3 that third graders gave a lower rating to the second instance of a story type, while sixth and ninth graders gave a higher rating to the replication.

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Insert Figure 3 about here

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Intercorrelations

There were highly significant correlations between reading ability and the ability to order a set of six sentences to form a story (see Table 1). The relationship was less robust on the rating measure, particularly but inexplicably, for grade six. Over all grades, but especially in grade three, the pairs correct accuracy measure was more highly correlated with reading ability than was the total correct score. In addition, and as would be expected, since the range of scores was very narrow for younger students, the relationship between the total correct score and reading comprehension improved when scores over the three tested grades were pooled.

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Insert Table 1 about here

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## Discussion

In order to understand more fully the results presented above, the performance of each grade on each story was analyzed not only in terms of the percentage of students at each grade who correctly discovered the total sequence but also in terms of the percentage using: (1) other common[1] total order, (2) the correct first two sentences, (3) other common first two sentence pairs, (4) the correct final two sentences, (5) other common final two sentence pairs, (6) the correct initial sentence, (7) other common initial sentences, (8) the correct final sentence, (9) other common final sentences, and (10) an event sequence.[2] The results of this analysis are displayed in Table 2.

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Insert Table 2 about here

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### Grade Differences

There was a striking improvement in task performance across grades. Not only did the percentage of correct orderings increase markedly from third to ninth grade but so too did the consistency of the incorrect orderings. An average of 73% of the total orderings given by ninth graders for each story version were either correct or else common responses. The corresponding percentages for sixth and third graders were 53% and 15%, respectively. While there was a substantial improvement from sixth to ninth grade, the startling difference was that between third grade and the two upper grades.

Looking at the choices for the first two sentences in each story version, we find that an average of 90% of the ninth graders' responses were either correct or common orderings, while for the sixth and third graders the figures were 73% and 61%, respectively. With respect to the last two sentences in each story version, an average of 87% of the ninth graders' responses, 75% of the sixth graders' responses, and 54% of the third graders responses were either correct or common choices. In both these cases there was a fairly steady improvement in performance from third to ninth grade.

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Insert Figure 4 about here

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Two facts stand out from these data. First, the performance of the third grade differed markedly from that of both sixth and ninth with respect to total ordering but not with respect to either pair-wise ordering. Second, the third graders' performance on total ordering was extremely low while their performance on the two pair-wise ordering measures was fairly good. An inference which may be drawn is that third graders attend more to ordering pairs of sentences than to ordering the set of sentences as a whole to make a complete story. This inference is supported by the fact that for third graders especially, the pairs correct accuracy measure was more highly correlated with reading ability than was the total correct score. The inference will receive further support below in the analysis of the strategies used in the task.

Structure Differences

In the results section we noted that on the basis of total correct scores, the order of difficulty of the structures from easiest to hardest was: setting (40%), question (28%), and conlusion (21%). We find the same order of difficulty when the measure is correct initial pair, correct final pair, and correct final sentence (Table 3).

If we now look at the percentage of students choosing the correct initial sentence, the same pattern again appears (Table 4). However, if we compare the percentage of students using the total correct order with the percentage using the correct initial sentence, an interesting fact emerges (Table 5). The percentage of those students getting the initial

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Insert Tables 3, 4, and 5 about here

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sentence correct who also got the total sequence correct differs very little in each grade across structures. Consequently, it appears that if we were to conceive of the task as involving two steps--(1) select the first sentence and (2) figure out the rest of the ordering--step one would be easiest for setting versions, but step two would be about equally difficult in all versions.

Replication Effects

There was an improvement in ordering when a story structure was repeated (each structure was repeated once). This occurred for every type of structure and at each grade: on total correct scores setting structures

improved from 32% to 49%, question structures went from 19% to 37%, and conclusion structures went from 14% to 27%; grade changes shown in Figure 2 indicate greater improvement by older children. The Latin Square ordering obviates the possibility that the effects could be due to story differences.

Since the percentage by which the conclusion and question structures scores improved was nearly double that of the improvement in the setting structure scores, we believe that the effects were the result of children developing schemata for new story structures from the task itself. Children appear to have an initial schema for the canonical form of a story and to attempt to fit the other story structures into that form. Before a structure is repeated, children have obtained a notion about how successful they were, about what syntactic information is critical, and about what strategies for ordering sentences are more and less effective. With a repetition, then, children are more likely than before to attend to additional clues and even to see from similarities in structures a new approach to ordering. Thus the nature of learning here can be one of efficiency--a better use of clues and a more organized approach--and, for some, of insight--a realization that a story can be represented by more than one schematic representation.

Structure by Grade Differences

While the same order of difficulty of structures across grades--setting, question, conclusion--was exhibited in choosing an initial sentence (see Table 4), it is clear that there was a substantial difference in difficulty for the question and conclusion structures at grades six and nine, while at grade

three the two were almost equally difficult. Furthermore, improvement seems to occur first in the setting structures, then in the question structures, and last in the conclusion structures. Improvement in dealing with the setting structures was minimal after the sixth grade since the sixth graders were already quite proficient in choosing an appropriate initial sentence in stories with setting structures. However, they had plenty of room for improvement in their handling of question and conclusion structures (see Figure 5).

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Insert Figure 5 about here

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The percentages of students in each grade giving totally correct sequences (shown in Figure 1) demonstrate a pattern similar to that of initial sentence choices. For third graders the conclusion and question versions patterned together, while the setting version was easier; for sixth and ninth graders the question version was distinctly easier than the conclusion version.

Within Structure Differences

If we now look at the correct ordering of stories in Table 2, we find that the stories did not all exhibit the same pattern across structures. The overall order of difficulty was setting, question, conclusion, but in the Parachutist and Bridge Builder stories the setting versions were not the easiest, while in the Border Dog and Bloodhound stories the question versions were not clearly easier than the conclusion versions. Furthermore, the

absolute scores for a specific structure varied greatly across stories. In an attempt to find an explanation for these discrepancies, each story was subjected to a story grammar analysis based on Stein and Glenn (1978) The categories for this analysis are: setting, initiating event, internal response, internal plan, attempt, direct consequence, and reaction (see Figure 6 for illustration of the analysis). Then each of the eighteen story

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Insert Figure 6 about here

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versions was examined to determine: (1) the number of story grammar categories expressed by the first sentence and (2) the number of propositions whose placement in the story was not in accord with their position in a logical sequence of events for the story. This information, together with total correct scores[3] for each story version for each grade and across grades, is displayed in Table 6.

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Insert Table 6 about here

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In both of the setting story versions which do not fit the general pattern (Bridge Builder and Parachutist), we find that more story grammar categories are contained in the first sentence than in any other setting story version--5 and 4 respectively compared to 1 and 2 in the other stories. To account for the fact that the scores on the question versions of Bloodhound are lower than those on the conclusion versions of this story together with the low score in absolute terms on the question version of Lost Dog, we

have to look beyond the data reported in Table 6 to another parameter of their initial sentences (Table 7).

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Insert Table 7 about here

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The first four initial sentences introduced general categories of individuals as the focus of attention and asked questions about them. This pattern appeared to be more acceptable to the children than ones in which more specific protagonists were discussed, i.e., Joan's lost dog and Mr. Nose, the famous bloodhound.

If we look now at the absolute scores for setting version stories, we find that if for each story we add the number of misplaced propositions to the number of story grammar categories contained in the first sentence, we have a -.85 correlation ($p < .02$) with the total correct score for that story. There is also a significant correlation for the question versions,

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Insert Table 8 about here

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$r = -.79$, $p < .05$, but not for conclusion versions, $r = -.46$, $p > .05$ (Table 8). This last result is to be expected, however, since conclusion versions by their nature must violate the logical order of propositions.

## Children's Use of Strategies

The strategy most strikingly used by the children was to order sentences so that the propositions which they expressed appeared in a natural sequence of events (see last entry in Table 2). Where the correct order

for a story version was consistent with an event sequence, 92% of the ninth graders' orderings, 79% of the sixth graders' orderings, and 40% of the third graders' orderings were consistent with an event sequence. Where the correct order for a story version was not consistent with an event sequence, 15% of the ninth graders' orderings, 33% of the sixth graders' orderings, and 23% of the third graders' orderings followed an event sequence. An example of incorrect use of the event sequence strategy may be found in the responses to the setting version of the Parachutist story. Twenty-two percent of the third graders, 35% of the sixth graders, and 17% of the ninth graders ignored both verb tense and appropriateness constraints on concluding sentences to produce the following incorrect order in which the last sentence has incorrectly been placed fourth (numbers indicate the correct order):

(1) After his airplane bust into flames Cliff Judkins leaped out.

(2) He pulled the ring on his parachute.

(3) But instead of opening, the parachute followed him like a long tail.

(6) He had fallen three miles and lived!

(4) Cliff landed in water and sank, caught in the parachute.

(5) Finally he floated to the surface.

The large number of erroneous orderings which conformed to an event sequence indicate that ordering according to an event sequence was one of the main strategies used by the children. Where such ordering was in fact correct, we find the expected pattern of development across grades; about 9/10 of

the ninth graders followed an event sequence strategy, about 8/10 of the sixth graders, and about 4/10 of the third graders, giving a ratio of 9 to 8 to 4. However, where ordering by event structure was incorrect, it was the sixth graders who made greatest use of it, the proportions using it for each grade being roughly: 2/12 for ninth, 4/12 for sixth, and 3/12 for third--a ratio of 2 to 4 to 3.

Parallel to the children's tendency to order sentences so that they did not violate an event sequence was their use of a strategy which places the sentence expressing the last event (action) in a story last. The use of the word finally in many of these sentences may also have triggered their placement of that sentence last. Across stories misuse of this strategy occured least by ninth graders (16%) and about equally by third and sixth graders (34% and 33%, respectively). The data which describe placement of a sentence expressing a final event are displayed in Table 9.

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Insert Table 9 about here

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Placing a concluding or summarizing sentence last is an alternative strategy which children appear to learn, as shown by Table 10. Where such placement was correct (for example, in setting versions of stories), the normal improvement from third to ninth grades occurred; while where such placement was incorrect (for example, in conclusion versions where the concluding sentences of setting versions had been rewritten so as to be initial sentences), it occured most frequently in the reponses of sixth graders (across stories, 35% in the sixth grade and 25% and 22% in the third and ninth grades, respectively).

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Insert Table 10 about here

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An example of the incorrect use of a conclusion-last strategy occurs in the conclusion version of the Bloodhound story, where 28% of the sixth graders and 18% of the ninth graders incorrectly placed the conclusion last rather than first, thus violating rules of pronominalization and verb tense and producing this incorrect sequence (correct order noted at left):

(2) Ten hours after leaving home she still had not come back.

(3) Mr. Nose began his search by sniffing her hat.

(4) Then he looked through the fields.

(5) Finally late at night he found her.

(6) Sally was tired but unharmed.

(1) Mr. Nose, the famous bloodhound, was the dog that found Sally Smith.

Another strategy the children used was that of beginning a story with the initiating event. Many stories in fact begin this way. Again, where this strategy was correct, i.e., in setting versions, it was used most by the ninth graders and least by the third graders. Where it was incorrect (in question and conclusion versions), ninth graders used it least. The question version of the Bloodhound story provides a good illustration of the use of this strategy. Forty-eight percent of the third graders, 59% of the sixth graders, and 44% of the ninth graders began this story with the sentence describing the initiating event despite the fact that such placement of this sentence--"Ten hours after leaving home, she still had not come back"--violates a general principle of pronominalization since this sentence

was designed to be placed after a sentence in which the noun antecedent to which the pronoun she refers was introduced, that is, second in the story:

| | | |
|---|---|---|
| Internal Response (goal) | (1) | Could Mr. Nose, the famous bloodhound, find Sally Smith? |
| Initiating Event | (2) | Ten hours after leaving home, she had still not come back. |
| Attempt | (3) | Mr. Nose began the search by sniffing her hat. |
| Attempt | (4) | Then he looked through the fields. |
| Direct Consequence | (5) | Finally, late at night, he found her. |
| Reaction | (6) | Sally was tired but unharmed. |

Table 11 displays the use of this strategy by grade and story.

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Insert Table 11 about here

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In the case of the Border Dog story another factor which may have contributed to initial placement of the sentence expressing the initiating event is that these sentences began with the familiar One day, a phrase which opens many stories. In the Lost Dog story the sentence, "Then one day a scratching noise was heard at the door," was placed first by 13% of the third graders in the setting version, 33% in the question version, and 16% in the conclusion version. None of the sixth and ninth graders made this error. Since this sentence describes the last event in the story, it would appear that its appearance first is most easily accounted for by the presence of the

phrase one day and the disregard of the adverb then. In fact, the sentence would not be a poor opening sentence (for another story) had it read, for example: "One day, Mary heard a scratching noise at the door."

Children also started stories with the sentence expressing the first action in the "attempt" (that is, the first action in a response to an initiating event or internal response [goal]). However, ninth graders used this strategy only in the one story version in which it is correct and in the four story versions in which the same sentence expresses both the initiating event and the first action. Third and sixth graders used this strategy in two story versions in which ninth graders did not, while third graders additionally used it in four story versions in which sixth graders did not.

For example, in the setting version of the Bloodhound story, 30% of the third graders but no sixth or ninth graders chose the sentence, "Mr. Nose began the search by sniffing her hat," as the initial sentence. This sentence describes the first action in the attempt sequence but was designed to be placed third in the story:

| | | |
|---|---|---|
| Initiating event | (1) | Ten hours after leaving home, Sally Smith still had not come back. |
| Internal response | (2) | Could Mr. Nose, the famous bloodhound, find her? |
| Attempt | (3) | Mr. Nose began the search by sniffing her hat. |
| Attempt | (4) | Then he looked through the fields. |
| Direct Consequence | (5) | Finally, late at night, he found her. |
| Reaction | (6) | Sally was tired but unharmed. |

The pattern across grades and stories is displayed in Table 12. A

confounding factor is that for the Mountain Climbers and Bridge Builder

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Insert Table 12 about here

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stories the sentences expressing the first action in the attempt contained the word first, while for the Bloodhound story that sentence contained the word began, and for the Border Dog story it contained the words one day. It is possible that these words, particularly one day, rather than or together with the story grammar category, influence the initial choice of sentence.

Still another strategy used particularly by third graders was to put a sentence describing a state (whether initial, medial, or final in the correct order) either first or second in a story; although, as seen throughout, where use of this strategy was correct, an increase from third to ninth is observed with ninth and sixth graders' percentage of use being much more similar to one another than third and sixth graders'. Tables 13 and 14 display the data.

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Insert Tables 13 and 14 about here

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The choice of a state to begin a story is probably related to the fact that in a typical folk story the stage is set before the action is introduced, and this stage setting occurs through the use of sentences describing states. Indeed the state sentence which most frequently was selected as the first or second sentence--and the only such sentence thus frequently inappropriately placed by ninth graders--was, "There was the

dog." This sentence is very close to a stereotypic story opener, "Once upon a time there was a dog," or the joke opener, "There was this dog . . . ."

Third graders differed from sixth and ninth graders in the use of yet another strategy for handling the task. As noted in the section on grade differences, they seem to have placed much more reliance on pairing sentences on the basis of lexical ties[4] as opposed to ordering the total set than did the older children. If we examine their common incorrect initial and final pairs, we find that very few fail to make sense when examined in isolation and in terms of their deep structure rather than of their surface structure. Of 86 pairs only 19% are meaningless, and some of those may be the result of pairing up the fourth and fifth or second and third sentences to make sense, rather than the initial or final sentences.

One example of an erroneous pairing based on a lexical tie occurs in the question version of the Bloodhound story. Twenty percent of the third graders but no sixth or ninth graders ended the story thus:

Mr. Nose began the search by sniffing her hat.

Finally, late at night, he found her.

Here the lexical ties are based on collocation and involve the pair <u>began</u> and <u>finally</u> and the pair <u>search</u> and <u>found</u>. The pairing is a logical one; however, it is incorrect in the context of the total story (as can be seen from the setting version, page 23). Another example comes from the setting version of the Border Dog story. Twenty-one percent of the third graders but again no sixth or ninth graders began the story with the following two sentences:

(1) One day a suspicious truck drove up to the border.

(2) He sniffed at the truck floor.

In this case the lexical tie is one of reiteration, more specifically one of superordination. A truck floor is part of a truck. Again, the sentence pair is acceptable (although the use in the second sentence of the pronoun "he" instead of a noun is anomalous); however, it does not fit in the total story whose correct order is:

(1) One day a suspicious truck drove up to the border.

(2) The border police searched it but could not find anything.

(3) Then they led a German Shepherd to the truck.

(4) He sniffed at the truck floor.

(5) Pulling it up, the police found a fortune in drugs.

(6) They had also found a new helper that drug smugglers could not fool.

Violation of Text Cohesive Aspects of Syntax and Lexicon

We stipulated above that the sentence pairs be examined in terms of their deep structure rather than their surface structure because all of the children often appear to have ignored syntactic and lexical aspects of text cohesion. The children seem to have based their ordering strategies much more on the propositional content of sentences than on the sentences' text cohesive properties. Their orderings often violate one or more syntactic rules. For example, generally pronominalization does not occur in a sentence unless the referent is made explicit either within that sentence or in a preceding sentence. This aspect of style seems to have had little

effect on the responses of the children. If we look just at common initial incorrect pairs we find that for setting versions an average of 27% of the third graders' responses violate the normal rule of pronominalization. Ninth graders gave common incorrect responses in violation of this rule in only one setting story version, Bloodhound, where they account for 13% of the total responses; sixth graders gave none. For question versions an average of 23% of the third graders' responses, 17% of the sixth graders', and 8% of the ninth graders' responses are in violation, while for conclusion versions an average of 25% of the third graders' responses, 22% of the sixth graders' responses, and 24% of the ninth graders' responses are in violation. The fact that for the sixth and ninth graders percentages are low, except in the conclusion version, probably reflects the greater difficulty of conclusion versions. For a particular story version as many as 48% of the third graders' responses, 50% of the sixth graders' responses, and 44% of the ninth graders' responses are in violation. An example of an initial sentence pair with premature pronominalization occurs in the conclusion version of the Lost Dog story. Sixteen percent of the third graders, 18% of the sixth graders, and 32% of the ninth graders began the story with the following sentences:

He had gotten lost on a seven-day trip.

Poor Joan couldn't forget about him even when she came home.

Given this ordering, the reader is left to wonder to whom he-him refers until late in the story. While authors occasionally do deliberately pronominalize in this way in order to create a specific effect--suspense for

example--such pronominalization is a sophisticated technique and was probably not used deliberately by the students studied.

Sequence of tenses was also ignored by many children (see Table 15). In five of the six conclusion versions, these children chose to end the

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Insert Table 15 about here

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story with the initial sentence (which in fact was, in terms of content, a good ending) despite the fact that the verb tense in four of these sentences was the simple past and in one a present perfect when in all five sentences the verb would have had to have been in the past perfect tense in order for the proper sequence of tenses to have been maintained. For example, in the Border Dog story, 24% of the third graders, 32% of the sixth graders, and 28% of the ninth graders ended the story with the sentence: "The border police have found a new helper that drug smugglers cannot fool." One total order in which this placement occurred (given by 28% of the ninth graders, 5% of the sixth graders, and no third graders) was the following:

(2) One day they searched a truck which they thought contained drugs.

(3) But they did not find anything.

(4) Then they led a German Shepherd to the truck.

(5) He sniffed at the truck floor.

(6) Pulling it up, the police found a fortune in drugs.

(1) The border police have found a new helper that drug smugglers cannot fool.

As the story makes clear the tense of the sixth sentence was chosen with initial placement of this sentence in view.

The fact that children ignored restrictions on sequence of tenses also facilitated their inappropriate placement of sentences in an event sequence. Thus, in the question versions of Lost Dog and Border Dog, a sizable number of children placed sentences in the event sequence which were intended to be placed last and whose tense was therefore the past perfect rather than the simple past appropriate to the children's placement (see Table 16). Twenty-five percent of the sixth graders and 13% of the ninth graders (although no third graders) produced the following sequence for the Lost Dog story:

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Insert Table 16 about here

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(1) Would Joan's little dog find his way home?

(2) He had gotten lost on a seven-day trip.

(3) A month passed.

(6) He had walked 700 miles to return home.

(4) Then one day a scratching noise was heard at the door.

(5) There was the dog.

Constraints on ellipsis also appear to have been ignored by many of the children. Fifty-six percent of the third graders, 50% of the sixth graders, and 12% of the ninth graders ignored the fact that ellipsis depends on a preceding sentence and placed the sentence--"Cliff Judkins did, when his airplane burst into flames and he had to leap out"--first in the question version of the Cliff Judkins story, the only version containing this sentence. To do so they must either have totally ignored the elliptical material and treated the sentence as if it stated just the propositions

Cliff Judkins' airplane caught on fire and Cliff Judkins leaped out or have treated it as if it contained those two plus Cliff Judkins fell three miles and lived. In either case the surface structure must have been ignored.

The children also ignored the way in which many lexical items function to insure cohesion in text. For example in the Lost Dog story, the sentence--"There was the dog"--was placed first by many children (in the setting version by 13% of the third graders; in the question version by 22% of the third graders, 60% of the sixth graders, and 38% of the ninth graders; and in the conclusion version by 44% of the third graders, 45% of the sixth graders, and 32% of the ninth graders). Such placement ignores the fact that it is the indefinite article rather than the definite article which would be appropriate if this sentence were to be the initial sentence since the noun has not been specified previously. Similarly 44% of the third graders and 17% of the sixth graders started the setting version of the Bridge Builder story with the sentence--"These waterfalls are wide and deep"--ignoring the demonstrative adjective these, which is appropriate only if the noun has been previously specified. Thirteen percent of the ninth graders began the conclusion version of the Mountain Climbers story with the sentence--"But how could blind men climb this mountain?"--ignoring not only the proper use of the demonstrative adjective, but also the fact that the word but indicates a contrast with preceding information.

Many children also ignored the role that the word however plays in text cohesion. As does but, it signals a type of contrast, and a sentence in which it is found immediately follows the sentence presenting the

contrasting information. Nevertheless, in the Bridge Builder story the sentence, "However, he (Ellet) proved them wrong," was placed inappropriately by a sizable number of children. For example, in the conclusion version 11% of the third graders, 25% of the sixth graders, and 13% of the ninth graders placed this sentence last when it should have been placed fourth, as it contrasts with the third sentence, producing:

(1) Charles Ellet built a bridge over Niagara Falls.

(2) But people had laughed when he said he would build a bridge there.

(3) They were sure no one could string a bridge cable over the Falls.

(5) He used a kite to draw first a cord, then a rope, and finally a cable across the Falls.

(6) Then he was able to build a bridge.

(4) However, Ellet proved them wrong.

Additionally, 13% of the ninth graders but no sixth or third graders misordered the story by contrasting the sentence containing However with the second sentence, "But people had laughed . . . ." This error indicates an awareness of the text cohesive properties of the word however but an incorrect assessment of the best contrast, and thus reflects greater text structure sophistication than did the first error discussed, a premise confirmed by the fact that neither third nor sixth graders made this error. Table 17 indicates across grades and versions what percentage placed the sentence correctly, what percentage made an incorrect but semantically acceptable (although not as good as the correct) choice, and what percentage made a totally incorrect placement.

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Insert Table 17 about here

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## Conclusion

In this study we have found pronounced developmental effects. Across the three structures--setting, question, and conclusion--we find consistent improvement from third to ninth grade in children's ability to order a story correctly. However, the pattern of improvement varies across structures. For third graders both question and conclusion structures are extremely difficulty. It is only in the setting versions of stories that they meet with a limited amount of success in total ordering. Sixth graders are able to handle both question and conclusion versions much better than third graders, but the improvement in question versions is greater than in conclusion versions. The difference between question and conclusion versions is maintained in the responses of ninth graders. An explanation for these findings may be that younger children have not acquired as complete a set of strategies to guide them in recovering the original story as have older children. Being less familiar with deviations in structure (marked forms here exemplified by the question and conclusion structures), younger children are more dependent upon the story following the "normal" or unmarked sequence (the setting structure). Such an explanation has been given by both Stein (1978) and Mandler and DeForrest (Note 1) for similar findings in story recall experiments.

Stein (1978) also found great variation in second graders' responses to a story reconstruction task similar to the one of this study, and she

concluded that:

> Memory demands and the complexity involved in reconstructing a sequence of twelve lines may have accounted for the variability in some of the orders produced during reconstruction. Young children may not be able to keep track of a logical sequence of this length. Thus, their strategy may be to chunk the sequence into smaller units, adhering to a strict logic within each chunk. (p. 19)

Our findings support this conclusion. Third graders' pairwise scores are much better than their total correct scores. Moreover, we have many examples of their incorrect use of lexical ties which results in a logical sentence pair but an illogical total story ordering.

With respect to the question posed in the introduction--What is the relative importance of underlying story schemata versus surfact text features in story comprehension?--we have obtained slightly equivocal results. On one hand, we have found, as did Stein (1978), that specific types of event sequences are expected to occur in stories. When stories do not conform to these expectations, story reconstructions often conform more to the expected sequence than to that designed by the authors. Furthermore, students performed best on all measures in stories with a setting structure, the canonical form for a story. Finally, evidence that students ignore rules for pronominalization, sequence of tenses, and ellipsis, and for the use of deictics and conjunctions suggests that they operate more with the propositional content of sentences than with elements of surface structure. However, there is a measure of contradictory evidence. Students do appear to pay attention to such obvious surface clues as the

presence of salient lexical ties and specific lexical items and phrases like first, finally, one day, and --- there was ---. In sum, it appears that while the underlying structure is the prime factor in story comprehension, some surface characteristics do have an effect.

Reference Note

1. Mandler, J. M., & De Forrest, M. A code in the node: Developmental differences in the use of a story schema. Paper presented at the meeting of the Society for Research in Child Development, New Orleans, 1977.

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## Footnotes

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[1]To be classified as common an ordering (total, initial, final, initial pair, final pair) had both to be incorrect and to be given by at least three subjects in a particular grade.

[2]Students were considered to have followed an event sequence if they placed sentences in the order in which the events which they described took place. To be counted as having followed an event sequence, the student need not have used the event sequence underlying the correctly ordered story but only to have selected an order of events not explicitly contradicted by the semantics of the sentences considered together.

[3]The total correct rather than pairs correct score is used because the focus is on the story grammar, the story as a whole, rather than on individual sentences.

[4]The use of the term lexical tie is based on that of Halliday and Hasan (1976).

Table 1

Intercorrelations with Reading Achievement and Grade

| | Total correct | Pair correct | Rating |
|---|---|---|---|
| All grades | | | |
| Grade | .61** | .70** | .45** |
| Vocabulary | .66** | .72** | .52** |
| Comprehension | .72** | .77** | .52** |
| Grade 3[a] | | | |
| Vocabulary | .37** | .57** | .48** |
| Comprehension | .38** | .55** | .54** |
| Grade 6[b] | | | |
| Vocabulary | .57** | .56** | .23 |
| Comprehension | .46** | .51** | .18 |
| Grade 9[c] | | | |
| Vocabulary | .32** | .29* | .35** |
| Comprehension | .61** | .53** | .33** |

*$p < .05$

**$p < .01$

[a]Gates-MacGinitie, Form $CS_2$

[b]Gates-MacGinitie, Survey D Form 3

[c]Gates-MacGinitie, 1972 edition

Table 2

Percentages of Students Obtaining Totally or Partially Correct Orderings of Stories as a Function of Grade and Structure[a]

| Grade | Lost Dog | | | Border Dog | | | Bloodhound | | | Mountain Climbers | | | Parachutist | | | Bridge Builder | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S | Q | C | S | Q | C | S | Q | C | S | Q | C | S | Q | C | S | Q | C |
| **Percent Using Total Correct Order** | | | | | | | | | | | | | | | | | | |
| 3 | 21 | 0 | 0 | 12 | 7 | 4 | 11 | 0 | 4 | 11 | 13 | 7 | 4 | 8 | 11 | 0 | 0 | 4 |
| 6 | 48 | 5 | 5 | 64 | 15 | 27 | 40 | 5 | 16 | 59 | 60 | 15 | 45 | 41 | 40 | 23 | 44 | 15 |
| 9 | 55 | 17 | 4 | 82 | 38 | 40 | 58 | 40 | 36 | 84 | 64 | 33 | 75 | 84 | 68 | 32 | 59 | 46 |
| **Percent Using Other Common Orders[b]** | | | | | | | | | | | | | | | | | | |
| 3 | 0 | 0 | 12 | 0 | 11 | 12 | 0 | 24 | 0 | 12 | 0 | 22 | 22 | 12 | 0 | 0 | 13 | 0 |
| 6 | 32 | 25 | 14 | 0 | 35 | 18 | 15 | 28 | 28 | 0 | 12 | 35 | 35 | 32 | 40 | 32 | 12 | 0 |
| 9 | 28 | 13 | 36 | 0 | 38 | 40 | 17 | 44 | 32 | 0 | 14 | 30 | 0 | 0 | 23 | 48 | 14 | 13 |
| **Percent with Correct First Two Sentences** | | | | | | | | | | | | | | | | | | |
| 3 | 46 | 11 | 4 | 38 | 22 | 16 | 15 | 0 | 13 | 16 | 21 | 7 | 33 | 16 | 17 | 16 | 17 | 22 |
| 6 | 84 | 15 | 9 | 72 | 55 | 50 | 40 | 5 | 20 | 64 | 72 | 20 | 90 | 50 | 44 | 41 | 64 | 25 |
| 9 | 86 | 33 | 16 | 95 | 79 | 60 | 58 | 40 | 41 | 88 | 95 | 50 | 96 | 84 | 68 | 44 | 100 | 79 |

Table 2 (continued)

| Grade | Lost Dog | | | Border Dog | | | Bloodhound | | | Mountain Climbers | | | Parachutist | | | Bridge Builder | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S | Q | C | S | Q | C | S | Q | C | S | Q | C | S | Q | C | S | Q | C |
| | Percent with Correct Final Two Sentences | | | | | | | | | | | | | | | | | |
| 3 | 21 | 0 | 12 | 17 | 15 | 20 | 11 | 12 | 17 | 27 | 29 | 19 | 7 | 48 | 17 | 8 | 0 | 7 |
| 6 | 48 | 10 | 27 | 72 | 20 | 32 | 70 | 50 | 32 | 73 | 30 | 25 | 50 | 86 | 44 | 32 | 44 | 25 |
| 9 | 55 | 25 | 20 | 82 | 46 | 48 | 96 | 92 | 64 | 88 | 64 | 50 | 75 | 92 | 73 | 60 | 82 | 50 |
| | Percent with Correct Initial Sentence | | | | | | | | | | | | | | | | | |
| 3 | 67 | 19 | 8 | 79 | 22 | 24 | 41 | 8 | 21 | 48 | 54 | 33 | 56 | 24 | 25 | 40 | 25 | 26 |
| 6 | 96 | 15 | 14 | 92 | 60 | 55 | 90 | 27 | 28 | 82 | 76 | 45 | 100 | 50 | 44 | 82 | 84 | 35 |
| 9 | 100 | 38 | 16 | 100 | 83 | 60 | 83 | 52 | 45 | 96 | 100 | 83 | 100 | 88 | 68 | 96 | 100 | 92 |
| | Percent with Correct Final Sentence | | | | | | | | | | | | | | | | | |
| 3 | 46 | 7 | 24 | 38 | 22 | 48 | 15 | 12 | 25 | 32 | 58 | 33 | 11 | 72 | 58 | 24 | 21 | 11 |
| 6 | 60 | 10 | 27 | 72 | 30 | 45 | 70 | 55 | 36 | 73 | 88 | 40 | 50 | 86 | 56 | 31 | 56 | 25 |
| 9 | 64 | 38 | 32 | 86 | 50 | 60 | 96 | 92 | 68 | 92 | 77 | 58 | 75 | 92 | 77 | 60 | 82 | 63 |

Table 2 (continued)

| Grade | Lost Dog | | | Border Dog | | | Bloodhound | | | Mountain Climbers | | | Parachutist | | | Bridge Builder | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S | Q | C | S | Q | C | S | Q | C | S | Q | C | S | Q | C | S | Q | C |
| | Percent Whose Orderings Conform to Underlying Event Structure in Story[c] | | | | | | | | | | | | | | | | | |
| | ✓ | ✓ | ✓ | | | | | | | | | ✓ | | | ✓ | ✓ | ✓ | ✓ |
| 3 | 25 | 48 | 8 | 21 | 37 | 40 | 70 | 44 | 42 | 20 | 25 | 30 | 37 | 44 | 29 | 12 | 29 | 15 |
| 6 | 36 | 60 | 27 | 84 | 75 | 68 | 90 | 86 | 88 | 77 | 72 | 40 | 80 | 91 | 40 | 41 | 24 | 15 |
| 9 | 23 | 54 | 8 | 96 | 96 | 92 | 100 | 100 | 91 | 92 | 73 | 0 | 92 | 96 | 32 | 28 | 14 | 4 |

[a] Indicated by S (setting), Q (question), and C (conclusion).

[b] Indicates common but incorrect orderings given by three or more students.

[c] ✓ indicates that the correct surface order for a story violates the underlying event structure of the story.

Table 3

Percentage of Students Choosing the Correct Initial 2 Sentences, Final 2 Sentences, and Final Sentence as a Function of Structure

| Structure | Initial 2 Sentences | Final 2 Sentences | Final Sentence |
|---|---|---|---|
| Setting | 57 | 50 | 56 |
| Question | 44 | 44 | 53 |
| Conclusion | 31 | 32 | 44 |

Table 4

Percentage of Students Choosing the Correct Initial Sentence as a Function of Grade

| Structure | Grade | | |
|---|---|---|---|
| | 3rd | 6th | 9th |
| Setting | 55 | 90 | 96 |
| Question | 25 | 52 | 77 |
| Conclusion | 23 | 37 | 61 |

Table 5

Percentage of Responses Which are Correct as a Function of Grade and Structure[a]

| Type of Score | Grade | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 3rd | | | 6th | | | 9th | | |
| | S | Q | C | S | Q | C | S | Q | C |
| Total | 10 | 5 | 5 | 46 | 28 | 20 | 64 | 50 | 38 |
| Initial Sentence | 55 | 25 | 23 | 90 | 52 | 37 | 96 | 77 | 61 |
| Ratio of Total to Initial Sentence | 18 | 20 | 22 | 52 | 54 | 54 | 66 | 65 | 62 |

[a]Indicated by S (setting), Q (question), and C (conclusion)

Table 6

Task Difficulty as a Function of Complexity of First Sentence and of Number of Misplaced Propositions

| Structure | Number of Story Grammar Categories Expressed by the First Sentence | Number of Misplaced Propositions | Percentage Total Correct | | | |
|---|---|---|---|---|---|---|
| | | | Across Grades | Grade | | |
| | | | | 3rd | 6th | 9th |
| Lost Dog | | | | | | |
| Setting | 1 | 3 | 41 | 21 | 48 | 55 |
| Question | 2 | 4 | 7 | 0 | 5 | 17 |
| Conclusion | 4 | 4 | 3 | 0 | 5 | 4 |
| Border Dog | | | | | | |
| Setting | 1 | 0 | 53 | 12 | 64 | 82 |
| Question | 2 | 2 | 20 | 7 | 15 | 38 |
| Conclusion | 3 | 2 | 24 | 4 | 27 | 40 |
| Bloodhound | | | | | | |
| Setting | 2 | 0 | 36 | 11 | 40 | 58 |
| Question | 2 | 1 | 15 | 0 | 5 | 40 |
| Conclusion | 2 | 1 | 19 | 4 | 16 | 36 |
| Mountain Climbers | | | | | | |
| Setting | 1 | 0 | 52 | 12 | 59 | 84 |
| Question | 2 | 0 | 45 | 13 | 60 | 64 |
| Conclusion | 3 | 1 | 19 | 7 | 15 | 33 |
| Parachutist | | | | | | |
| Setting | 4 | 1 | 41 | 4 | 45 | 75 |
| Question | 1 | 2 | 44 | 8 | 41 | 84 |
| Conclusion | 3 | 2 | 39 | 11 | 40 | 68 |
| Bridge Builder | | | | | | |
| Setting | 5 | 2 | 18 | 0 | 23 | 32 |
| Question | 2 | 1 | 34 | 0 | 44 | 59 |
| Conclusion | 2 | 1 | 22 | 4 | 15 | 46 |

Table 7

Task Difficulty as a Function of Nature of First Sentence

| Story | Percent Total Correct | Percent Initial Correct | Initial Sentence, Question Structure |
|---|---|---|---|
| Mountain Climbers | 45 | 75 | How could seven young blind men climb a mountain? |
| Parachutist | 44 | 54 | Can a man fall three miles and live? |
| Bridge Builder | 34 | 70 | Could anyone build a bridge over Niagara Falls? |
| Border Dog | 20 | 55 | Can the border police find drugs hidden in a truck? |
| Bloodhound | 15 | 29 | Could Mr. Nose, the famous blood-hound, find Sally Smith? |
| Lost Dog | 7 | 24 | Would Joan's little dog find his way home? |

Table 8

Relationship Between Text Complexity and Sequencing Accuracy

| Structure | Text Complexity Value | Percent Total Correct |
|---|---|---|
| Setting | | |
| Border Dog | 1 | 53 |
| Mountain Climbers | 1 | 52 |
| Bloodhound | 2 | 36 |
| Lost Dog | 4 | 41 |
| Parachutist | 5 | 41 |
| Bridge Builder | 7 | 18 |
| Question | | |
| Mountain Climbers | 2 | 45 |
| Parachutist | 3 | 44 |
| Bridge Builder | 3 | 34 |
| Bloodhound | 3 | 15 |
| Border Dog | 4 | 20 |
| Lost Dog | 6 | 7 |
| Conclusion | | |
| Bloodhound | 3 | 19 |
| Bridge Builder | 3 | 22 |
| Mountain Climbers | 4 | 19 |
| Border Dog | 5 | 24 |
| Parachutist | 5 | 39 |
| Lost Dog | 8 | 3 |

Table 9

Percent of Responses Involving Last Position Use

of a Sentence Expressing a Final Event (action)

| Structure | Grade | | |
|---|---|---|---|
| | 3rd | 6th | 9th |
| Lost Dog | | | |
| Setting | 17 | 0 | 0 |
| Question | 26 | 45 | 29 |
| Conclusion | 12 | 14 | 0 |
| Border Dog | | | |
| Setting | 29 | 20 | 14 |
| Question | 41 | 70 | 50 |
| Conclusion[a] | 48 | 45 | 60 |
| Bloodhound | | | |
| Setting[b] | 70 | 30 | 0 |
| Question[b] | 72 | 45 | 0 |
| Conclusion[b] | 25 | 56 | 27 |
| Mountain Climbers | | | |
| Setting[b] | 44 | 23 | 0 |
| Question[b] | 13 | 0 | 23 |
| Conclusion[a,b] | 33 | 40 | 58 |
| Parachutist | | | |
| Setting[b] | 56 | 50 | 21 |
| Question[a,c] | 76 | 82 | 92 |
| Conclusion[a,c] | 58 | 56 | 77 |
| Bridge Builder | | | |
| Setting | 48 | 55 | 32 |
| Question | 13 | 24 | 18 |
| Conclusion | 11 | 25 | 13 |

[a]Last position use of a sentence expressing a final event (action) was correct.

[b]The final action sentence which began with the word Finally was not the correct last sentence.

[c]The final action sentence which began with the word Finally was not the correct last sentence.

Table 10

Percentage of Last Sentence Responses Which Conform to Canonical Structure

| Structure | Grade | | |
|---|---|---|---|
| | 3rd | 6th | 9th |
| Setting Version | | | |
| Lost Dog | 46 | 60 | 64 |
| Border Dog | 38 | 72 | 86 |
| Bloodhound | 15 | 70 | 96 |
| Mountain Climbers | 32 | 73 | 92 |
| Parachutist | 11 | 50 | 75 |
| Bridge Builder | 24 | 31 | 60 |
| Average Across Stories | 28 | 59 | 79 |
| Conclusion Version | | | |
| Lost Dog | 36 | 45 | 52 |
| Border Dog | 24 | 32 | 27 |
| Bloodhound | 25 | 56 | 27 |
| Mountain Climbers | 4 | 5 | 8 |
| Parachutist | 17 | 36 | 23 |
| Bridge Builder | 48 | 40 | 8 |
| Average Across Stories | 25 | 35 | 22 |

[a]The setting version of a story is its canonical form. Therefore, the above reported sentence placement of setting versions is correct, while that of conclusion versions is incorrect.

Table 11

Percent of Responses Involving First Position Use of a Sentence Expressing an Initiating Event[a]

| Structure | Grade | | |
|---|---|---|---|
| | 3rd | 6th | 9th |
| Lost Dog | | | |
| Setting | 67 | 96 | 100 |
| Question | 22 | 0 | 17 |
| Conclusion | 24 | 32 | 36 |
| Border Dog | | | |
| Setting | 79 | 92 | 100 |
| Question | 41 | 35 | 17 |
| Conclusion | 60 | 45 | 40 |
| Bloodhound | | | |
| Setting | 41 | 90 | 83 |
| Question | 48 | 59 | 44 |
| Conclusion | 33 | 60 | 45 |
| Parachutist | | | |
| Setting | 56 | 100 | 100 |
| Question | 56 | 50 | 12 |
| Conclusion | 42 | 52 | 32 |
| Average Percent Across Stories[b] | | | |
| Setting | 58 | 92 | 96 |
| Question | 42 | 36 | 23 |
| Conclusion | 40 | 48 | 38 |

[a]First position use of an initiating event is correct only for setting versions of stories.

[b]None of the versions of Bridge Builder or Mountain Climbers has an initiating event.

Table 12

Percent of Responses Involving First Position Use of a Sentence Expressing the First Action in the Attempt

| Structure | Grade | | |
|---|---|---|---|
| | 3rd | 6th | 9th |
| Lost Dog | | | |
| Setting | 0 | 0 | 0 |
| Question | 0 | 0 | 0 |
| Conclusion[a] | 8 | 14 | 16 |
| Border Dog | | | |
| Setting | 0 | 0 | 0 |
| Question[b] | 41 | 35 | 17 |
| Conclusion[b] | 60 | 45 | 40 |
| Bloodhound | | | |
| Setting | 30 | 0 | 0 |
| Question | 12 | 0 | 0 |
| Conclusion | 0 | 0 | 0 |
| Mountain Climbers | | | |
| Setting | 36 | 0 | 0 |
| Question | 29 | 24 | 0 |
| Conclusion | 44 | 50 | 0 |
| Parachutist | | | |
| Setting | 0 | 0 | 0 |
| Question[b] | 56 | 50 | 12 |
| Conclusion[b] | 42 | 52 | 32 |
| Bridge Builders | | | |
| Setting | 0 | 0 | 0 |
| Question | 29 | 0 | 0 |
| Conclusion | 0 | 0 | 0 |

[a]Indicates that initial use of a sentence expressing an attempt was correct.

[b]Indicates that a sentence expressing an attempt also expressed an initiating event.

Table 13

Percent of Responses Placed First

of a Sentence Expressing a State[a]

| Structure | Grade | | |
|---|---|---|---|
| | 3rd | 6th | 9th |
| Lost Dog | | | |
| Setting | 13 | 0 | 0 |
| Question | 22 | 60 | 38 |
| Conclusion | 44 | 45 | 44 |
| Bloodhound | | | |
| Setting | 15 | 0 | 0 |
| Question | 24 | 0 | 0 |
| Conclusion | 17 | 0 | 0 |
| Mountain Climbers | | | |
| Setting[b] | 48 | 82 | 96 |
| Bridge Builder | | | |
| Setting | 44 | 14 | 0 |
| Question | 0 | 0 | 0 |
| Conclusion | 26 | 30 | 0 |

[a]The Border Dog and Parachutist stories together with the Question and Conclusion version of the Mountain Climbers story do not contain sentences expressing states.

[b]The story version correctly begins with a sentence describing a state.

Table 14

Percent of Responses Involving in Second Position

Use of a Sentence Expressing a State

| Structure | Grade | | |
|---|---|---|---|
| | 3rd | 6th | 9th |
| Lost Dog | | | |
| Setting | 0 | 0 | 0 |
| Question | 19 | 0 | 0 |
| Conclusion | 16 | 18 | 32 |
| Bloodhound | | | |
| Setting | 0 | 0 | 0 |
| Question | 36 | 18 | 0 |
| Conclusion | 13 | 12 | 0 |
| Mountain Climbers | | | |
| Setting | 16 | 0 | 0 |
| Bridge Builders | | | |
| Setting[a] | 16 | 41 | 44 |
| Question | 16 | 20 | 0 |
| Conclusion | 0 | 15 | 0 |

[a]The story version correctly has a sentence describing a state in second position.

Table 15

Percentage of Responses Violating the Sequence of Tense Rules in Choice of Final Sentence as a Function of Grade

| Conclusion Version Story | Grade | | |
|---|---|---|---|
| | 3rd | 6th | 9th |
| Lost Dog | 36 | 45 | 52 |
| Border Dog | 24 | 32 | 27 |
| Mountain Climbers | 44 | 55 | 17 |
| Parachutist | 17 | 36 | 23 |
| Bridge Builder | 48 | 40 | 0 |

Table 16

Percentage of Responses in Which Conclusion Sentences Were Placed in the Event Sequence as a Function of Grade

| Story | Grade | | |
|---|---|---|---|
| | 3rd | 6th | 9th |
| Lost Dog | 0 | 25 | 13 |
| Border Dog | 11 | 35 | 38 |

Table 17

Placement of "However" in Context

of the Bridge Builder Story

| Structure and Grade | Percent of Sentence Placement | | |
|---|---|---|---|
| | Correct | Acceptable[a] | Unacceptable |
| Setting | | | |
| 3rd | 24 | 32 | 44 |
| 6th | 27 | 18 | 55 |
| 9th | 44 | 32 | 24 |
| Question | | | |
| 3rd | 28 | 8 | 63 |
| 6th | 56 | 8 | 36 |
| 9th | 68 | 9 | 23 |
| Conclusion | | | |
| 3rd | 30 | 30 | 41 |
| 6th | 40 | 30 | 30 |
| 9th | 58 | 25 | 17 |

[a]Sentence placement semantically acceptable but incorrect

## Figure Captions

Figure 1. Grade by structure interaction, total correct score.

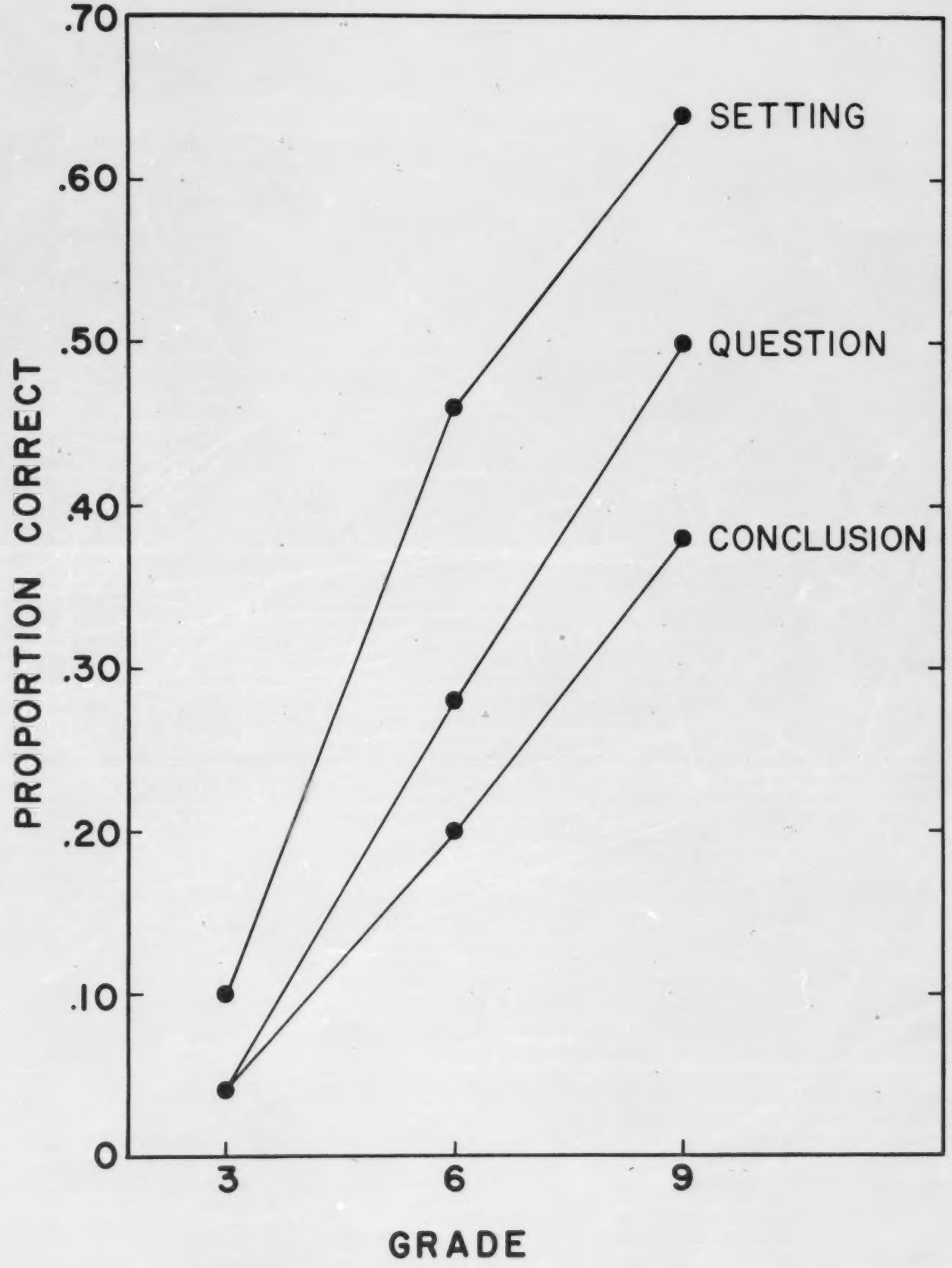
Figure 2. Grade by replication interaction, total correct score.

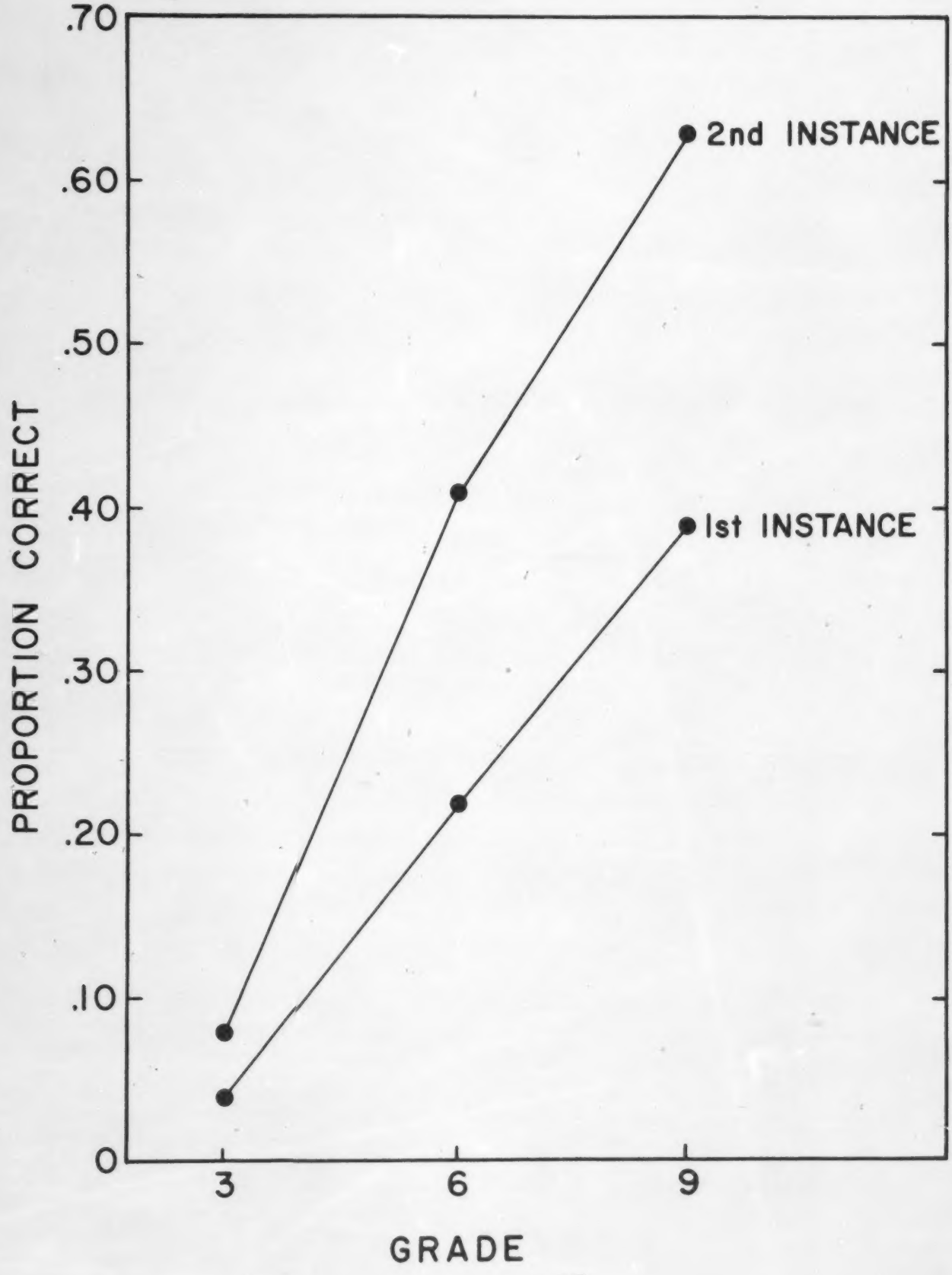
Figure 3. Grade by replication interaction, rating score.

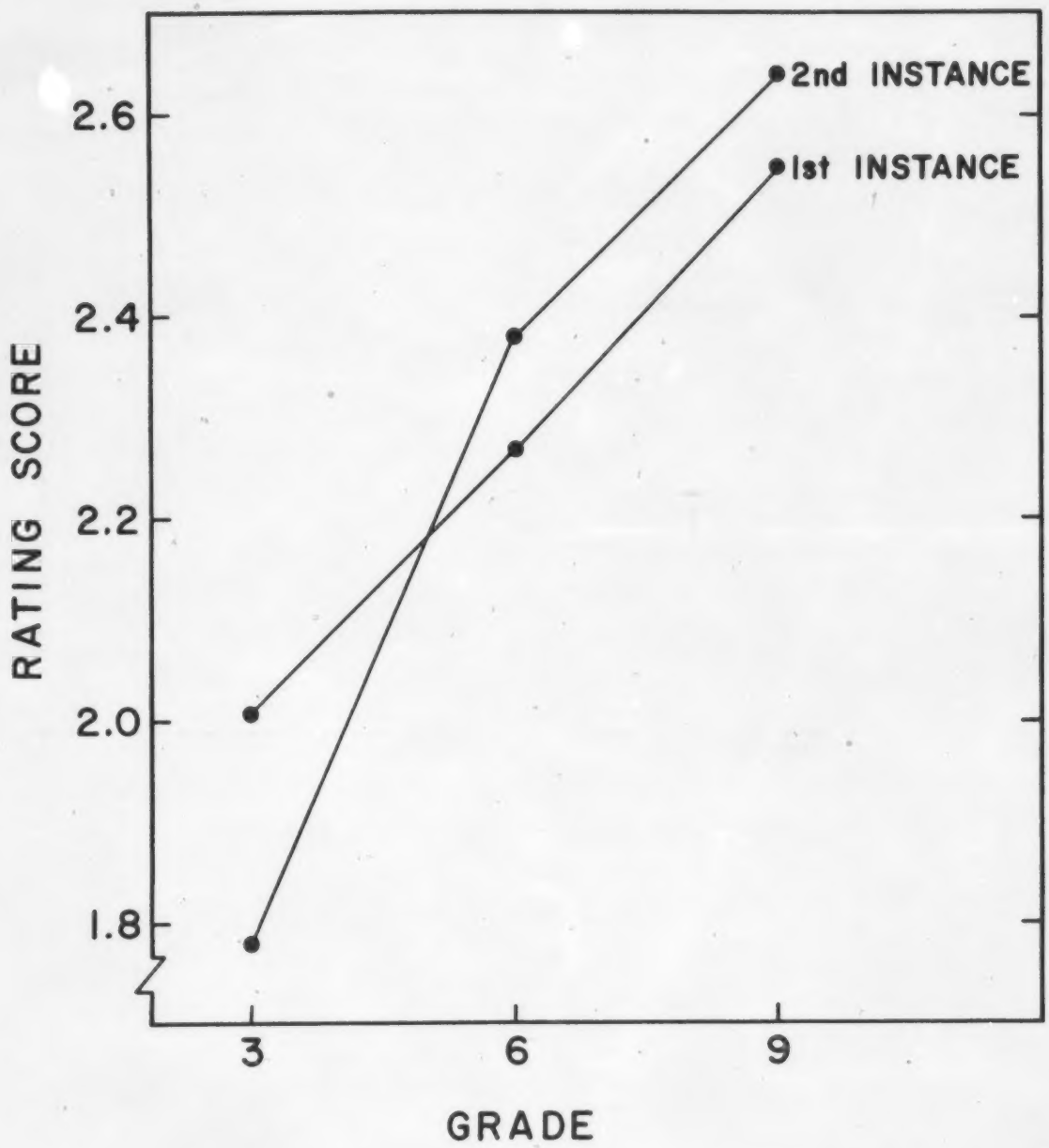
Figure 4. Comparisons across grade of total ordering with initial and final sentence pairs.

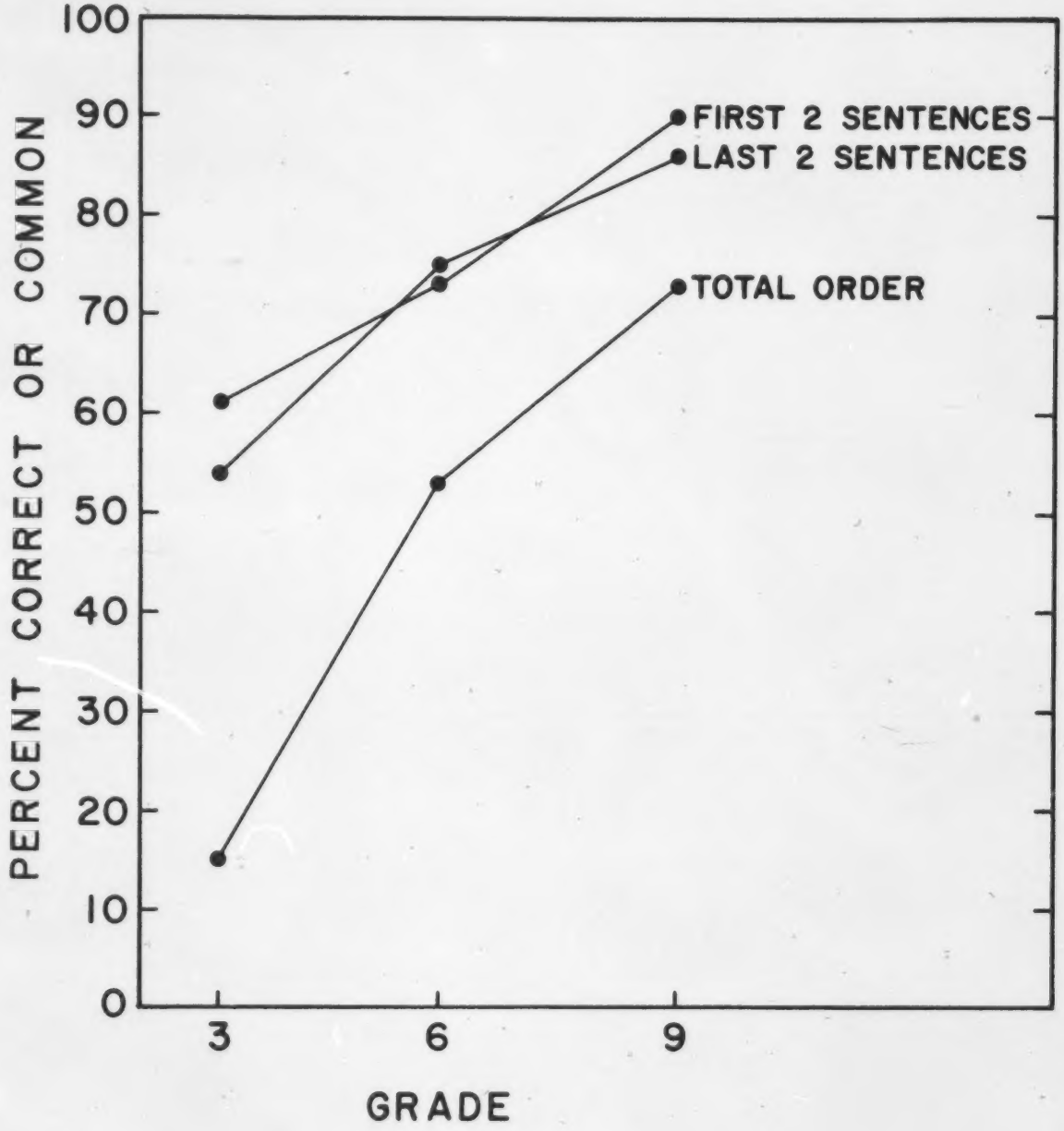
Figure 5. Correct selection of initial sentence as a function of grade and structure.

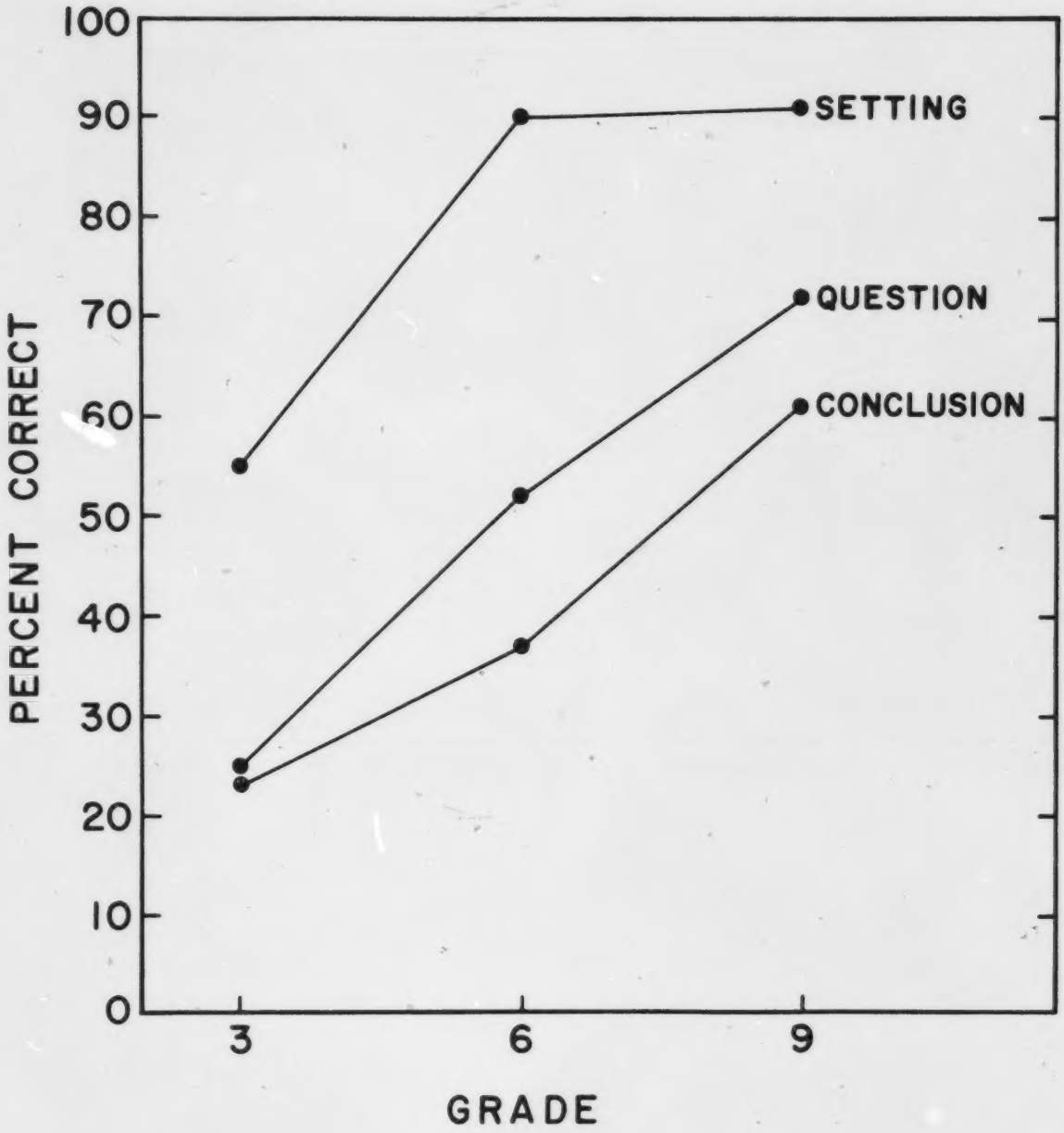
Figure 6. Story grammar diagram of the Parachutist Story.

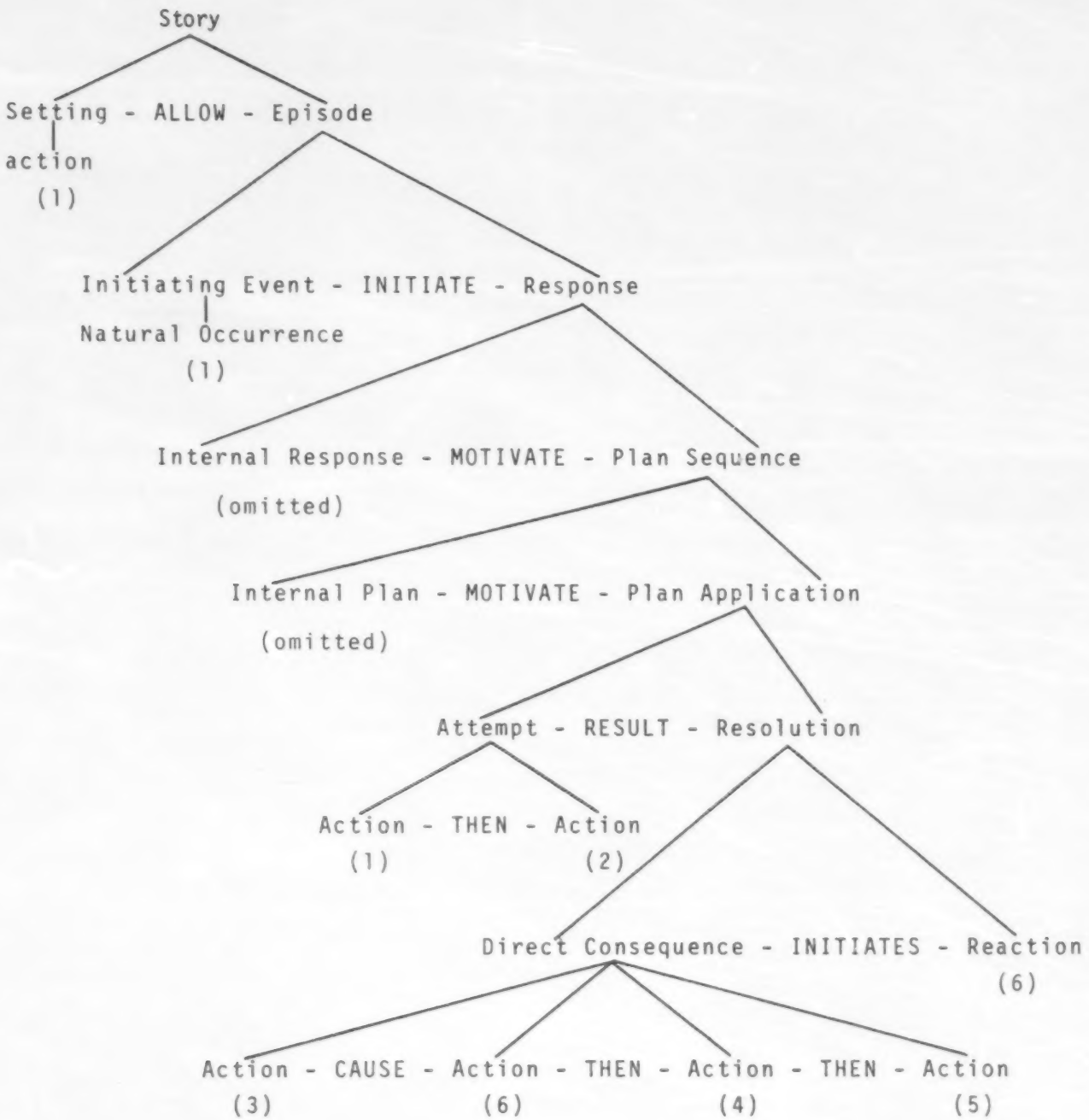

.70
.60
.50
.40
.30
.20
.10
0
PROPORTION CORRECT
SETTING
QUESTION
CONCLUSION
3
6
9
GRADE


.70
.60
.50
.40
.30
.20
.10
0
PROPORTION CORRECT
2nd INSTANCE
1st INSTANCE
3
6
9
GRADE


2nd INSTANCE
1st INSTANCE
RATING SCORE
2.6
2.4
2.2
2.0
1.8
3
6
9
GRADE


100
90
80
70
60
50
40
30
20
10
0
PERCENT CORRECT OR COMMON
FIRST 2 SENTENCES
LAST 2 SENTENCES
TOTAL ORDER
3
6
9
GRADE


100
90
80
70
60
50
40
30
20
10
0
PERCENT CORRECT
SETTING
QUESTION
CONCLUSION
3
6
9
GRADE




(1) After his airplane burst into flames Cliff Judkins leaped out.

(2) He pulled the ring on his parachute.

(3) But instead of opening, the parachute followed him like a long tail.

(4) Cliff landed in water and sank, caught in the parachute.

(5) Finally he floated to the surface.

(6) He had fallen three miles and lived!

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